What is claimed is:

1. A flexible tow cable capable of measuring water temperature, said tow cable comprising:

an optical fiber extending along a longitudinal axis of said tow cable;

a section with encompassing said optical fiber;

a first plurality of strength wires extending along an outer surface of said section in a first layer;

a first set of surrounding optical fiber interspersed with said strength wires and intersecting a vector extending radially from said optical fiber at the longitudinal axis to an outer surface of said tow cable;

a second plurality of strength wires extending along an exterior of said first layer in a second layer; and

a second set of surrounding optical fiber interspersed with said strength wires of said second layer and intersecting the vector;

wherein the temperature of a surrounding water column of said tow cable is calculable based on measurements of light emitted in said optical fibers and onto the vector.

2. The flexible tow cable in accordance with claim 1 wherein said first and second sets of surrounding optical fiber intersect additional vectors extending radially to the outer surface from said optical fiber at the longitudinal axis, the additional vectors positioned along the length of said tow cable such that the temperature of the surrounding water column at various points along said tow cable is calculable based on measurements of light of emitted in said optical fibers and onto the additional vectors.

3. The flexible tow cable in accordance with claim 1 wherein said first and second sets of surrounding optical fiber extend along said tow cable as a helix surrounding the longitudinal axis.

4. The flexible tow cable in accordance with claim 3 wherein said first and second sets of surrounding optical fiber intersect additional vectors extending radially to the outer surface from said optical fiber at the longitudinal axis, the additional vectors positioned along the length of said tow cable such that the temperature of the surrounding water column at various points along said tow cable is calculable based on measurements of light of emitted in said optical fibers and onto the additional vectors.

5. A flexible tow cable capable of measuring temperature, said tow cable comprising:

an optical fiber extending parallel and helical to a longitudinal axis of said tow cable;

a section encompassing said optical fiber;

a first plurality of strength wires extending along an outer surface of said section in a first layer;

a first set of surrounding optical fiber interspersed with said strength wires and intersecting at least one

vector extending radially from said encompassed optical fiber to an outer surface of said tow cable;

a second plurality of strength wires extending along an exterior of said first layer in a second layer; and

a second set of surrounding optical fiber interspersed with said strength wires of said second layer and intersecting the vector;

wherein the temperature of a surrounding water column of said tow cable is calculable based on measurements of light emitted in said optical fibers and onto the vector.

6. The flexible tow cable in accordance with claim 5 wherein said first and second sets of surrounding optical fiber intersect additional vectors extending radially to the outer surface from said encompassed optical fiber, the additional vectors positioned along the length of said tow cable such that the temperature of the surrounding water column at various points along said tow cable is calculable based on measurements of light of emitted in said optical fibers and onto the additional vectors.

7. The flexible tow cable in accordance with claim 5 wherein said first and second sets of surrounding optical fiber extend along said tow cable as a helix surrounding the longitudinal axis.

8. The flexible tow cable in accordance with claim 7 wherein said first and second sets of surrounding optical fiber intersect additional vectors extending radially to said outer surface from said encompassed optical fiber, the additional vectors positioned along the length of said tow cable such that the temperature of the surrounding water column at various points along said tow cable is calculable based on measurements of light of emitted in said optical fibers and onto the additional vectors.

9. A system of measuring temperature distribution in a water column, said system comprising:

a tow cable including an optical fiber extending along a longitudinal axis of said tow cable and encompassed by a section, a first plurality of strength wires extending along an outer surface of said section in a first layer, a first set of surrounding optical fiber

interspersed with said strength wires, a second plurality of strength wires around said first layer in a second layer and a second set of surrounding optical fiber interspersed with said strength wires of said second layer wherein said first and second sets of surrounding optical fiber intersect a vector extending radially to an outer surface from said optical fiber at the longitudinal axis;

an optical measuring means for inputting light energy into said optical fibers and for receiving return light energy from said optical fibers; and

a data processing means for determining a temperature at a point along the water column based on measurements of light of emitted in said optical fibers and onto the vector.

10. The system in accordance with claim 9 wherein said first and second sets of surrounding optical fiber intersect additional vectors extending radially to the outer surface from said optical fiber at the longitudinal axis, the additional vectors positioned along the length of said tow cable such that the temperature of the water column at various points along said

tow cable is calculable based on measurements of light of emitted in said optical fibers and onto the additional vectors.

11. The system in accordance with claim 9 wherein said first and second sets of surrounding optical fiber extend along said tow cable as a helix surrounding the longitudinal axis.

12. The system in accordance with claim 11 wherein said first and second sets of surrounding optical fiber intersect additional vectors extending radially to the outer surface from said optical fiber at the longitudinal axis, the additional vectors positioned along the length of said tow cable such that the temperature of the water column at various points along said tow cable is calculable based on measurements of light of emitted in said optical fibers and onto the additional vectors.

13. The system in accordance with claim 12 wherein the temperature of the water column is determined by solving LaPlace's equation and finding a resultant temperature provided by a least squares optimization between the solution of LaPlace's equation and the measurable temperatures.

14. The system in accordance with claim 13 wherein appropriate solutions to LaPlace's equation are pre-computed and stored such that the least squares optimization can be achieved quicker in comparison to solving LaPlace's equation in real time.